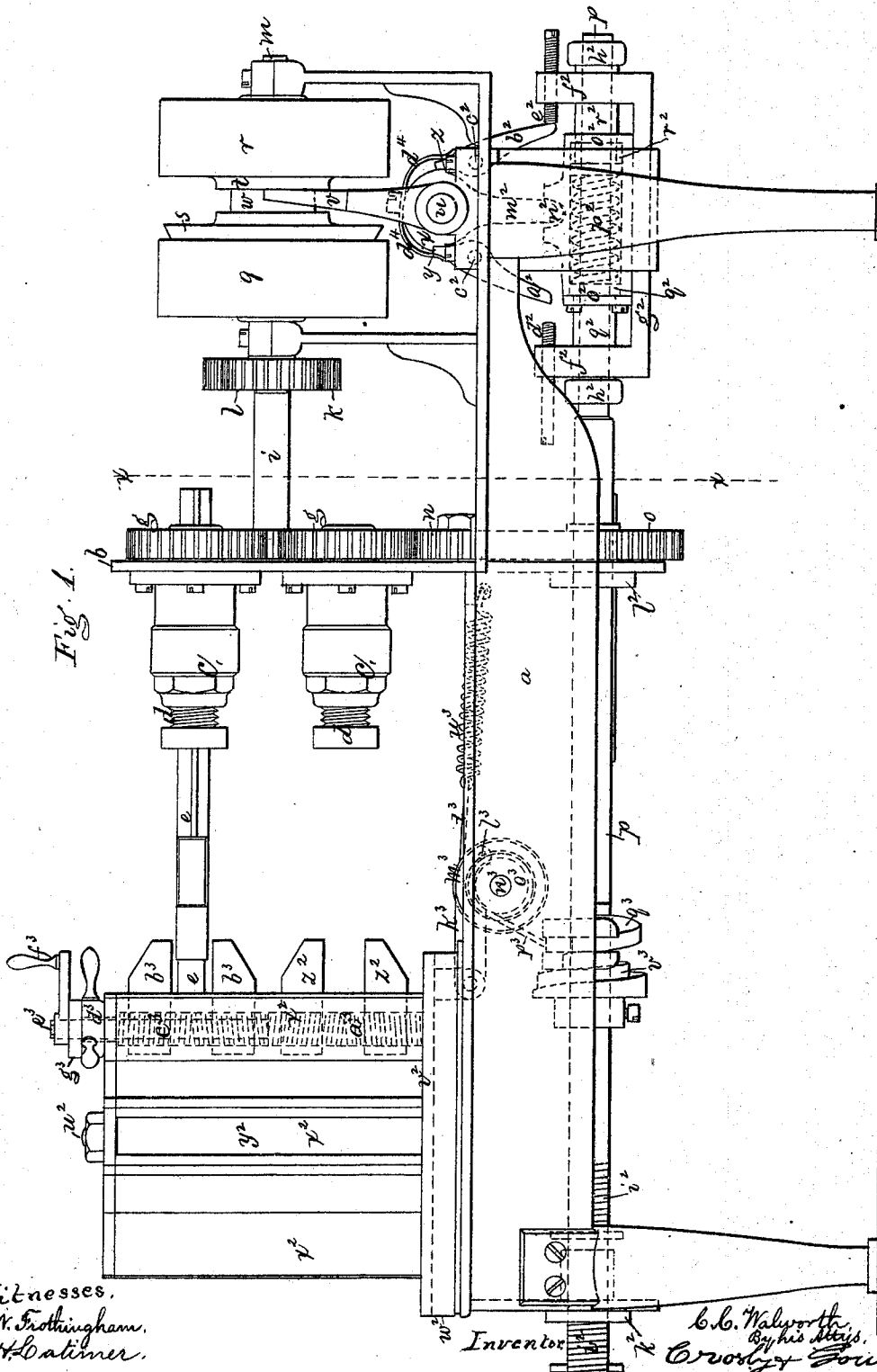


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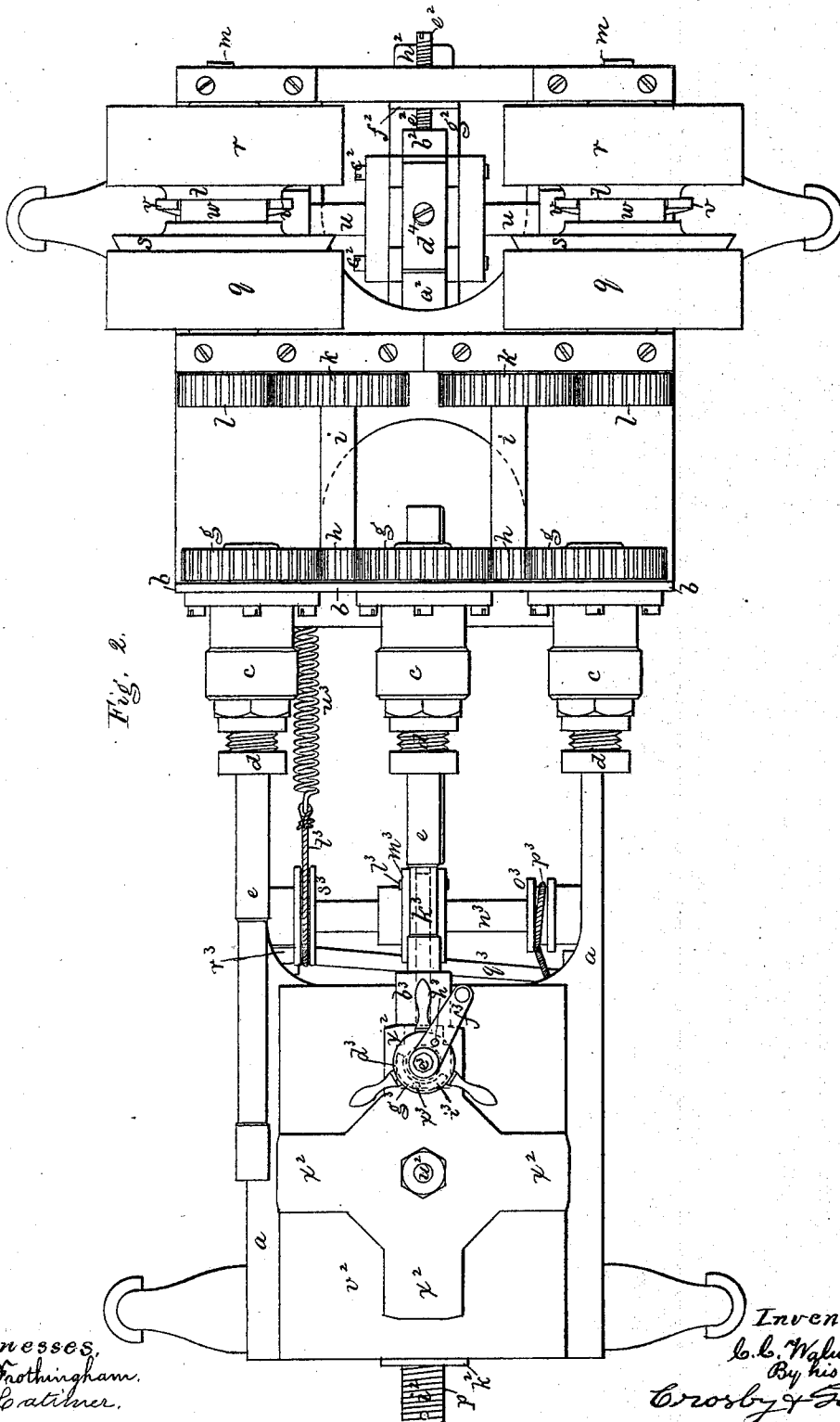
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No. 144,374.

Patented Nov. 4, 1873.



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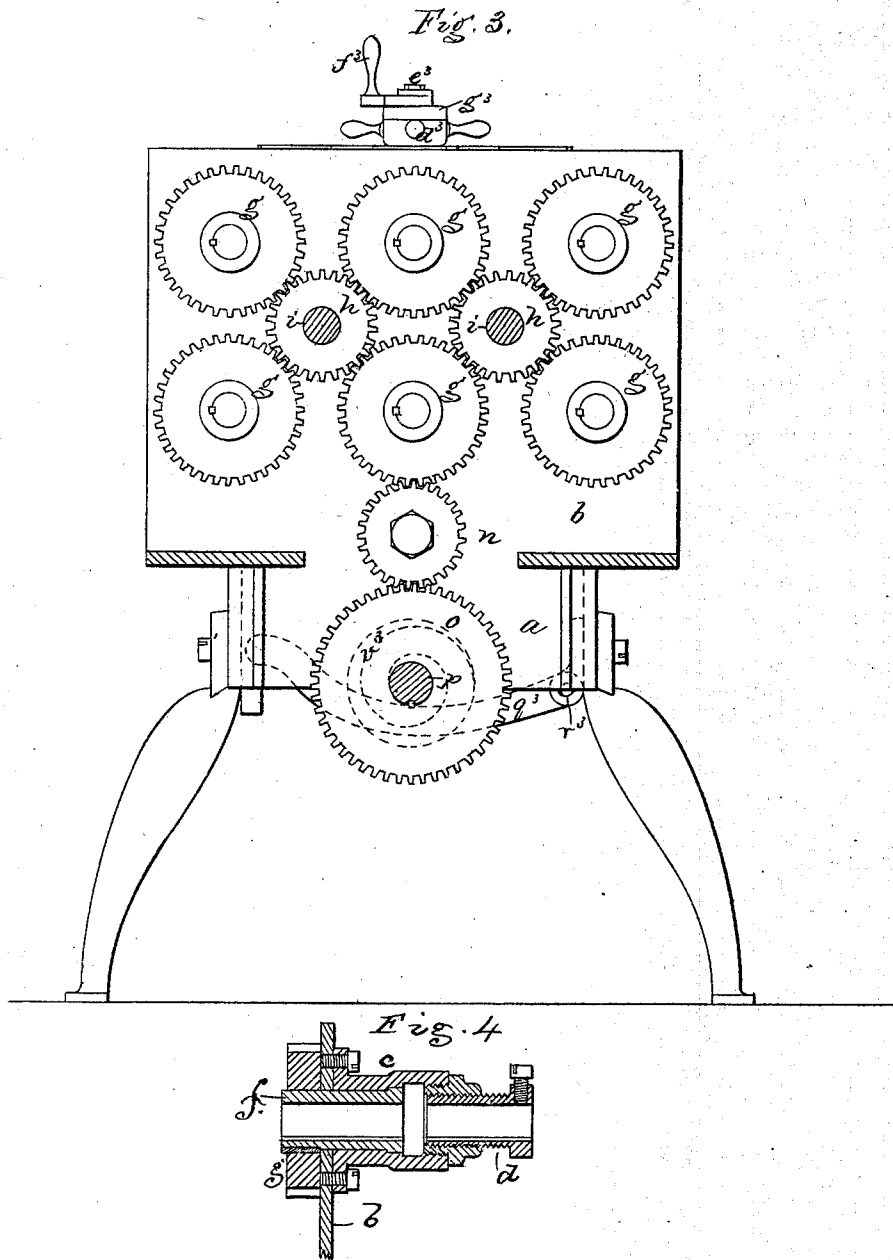
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Inventor  
 C. C. Walworth.  
 By his Atty.  
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# UNITED STATES PATENT OFFICE.

CALEB C. WALWORTH, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN MACHINES FOR TAPPING GAS AND WATER FITTINGS.

Specification forming part of Letters Patent No. 144,374, dated November 4, 1873; application filed March 15, 1873.

*To all whom it may concern:*

Be it known that I, CALEB C. WALWORTH, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Screw-Cutting Machines; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

The invention relates to the organization of a screw-cutting engine of that class particularly designed for screw-threading pipe-fittings, and for operating upon several fittings simultaneously. More particularly the invention has reference to the peculiar arrangement or combination of mechanism by which the screw-cutting tools are automatically advanced to their work and withdrawn therefrom, and to the combination and arrangement of mechanism by which the work-holding vise is operated. Also, to the mechanism for operating the respective jaws or clamps of each branch of the compound vise, so that fittings of varying diameter may be readily clamped.

United States Letters Patent No. 25,779 were granted to me in 1859, for improvements in such machines, and my present invention relates in part to an organization embracing some of the general features shown in said patent.

The drawing represents a machine embodying my invention.

Figure 1 shows the machine in side elevation. Fig. 2 is a plan of it. Fig. 3 is a vertical cross-section on the line  $x x$  and looking toward the gear-train. Fig. 4 shows in section one of the leading-screws and its connections.

$a$  denotes a frame;  $b$ , an upright having fixed to it nuts  $c$ , in which rotate the leading-screws  $d$  that carry the mandrels or stocks  $e$  of the taps or screw-cutting tools. There may be any suitable number of these leading-screws for operating cutters to work at the same time upon fittings clamped in the center and side jaws of the vise. The drawing shows a construction for six screws, three for a center and side fittings in the lower jaws of the vise, and three for fittings in the jaws over said lower ones. All the screws of the series are simul-

taneously operated as follows: Each mandrel is made fast to its screw  $d$  by a set-screw or other device, and extends through the screw, and through the nut  $c$ , and a quill,  $f$ , the nut being fastened to the upright. The quill turns in the nut and is splined to the mandrel, and has a gear-pinion,  $g$ , fast on its rear end. The arrangement and connection of the mandrel, nut, screw, quill, gear, and upright are shown in Fig. 4. The screw  $d$  is held within the nut  $c$  by its own screw-thread, as seen. The several gears are connected so as to run together by intermediate pinions  $h$  fixed on shafts  $i$ , which shafts also bear pinions  $k$ , meshing into and driven by gears  $l$  on pulley-shafts  $m$ . One of the pinions  $g$  engages with and drives a pinion,  $n$ , that meshes into and drives a pinion,  $o$ , on a reversing-shaft,  $p$ , which shaft, having a spline-and-groove connection with the gear  $o$ , slides in but rotates with the gear  $o$ . Each pulley-shaft has two loose belt-pulleys,  $q r$ , and two friction clutch-pulleys,  $s t$ , the pulleys  $s t$  sliding upon but driving the shafts  $m$ , and being driven in one or the reverse direction, accordingly as the pulley  $s$  is thrown into connection with the pulley  $q$ , or the pulley  $t$  into connection with the pulley  $r$ , the pulleys  $s t$  being clutch or friction pulleys, and the pulleys  $q r$  open and cross-belt pulleys for driving the respective pulleys  $s t$  in opposite directions. The leading-screws  $d$  are arranged to advance to prearranged or adjustably-arranged distances, according to the length of screw to be cut, and the advance and reverse movements are automatically effected as follows:  $u$  denotes a cross-shaft, having shipper-forks  $v$  extending into grooves  $w$  between the respective pulleys of each shaft. Upon the shaft  $u$  is fixed a collar,  $x$ , having two shoulders,  $y z$ .  $a^2 b^2$  denote two catch-pawls, pivoted as seen at  $c^2 c^2$ , the upper arm of each pawl being pressed against the collar  $x$  by a spring,  $d^1$ , and the lower arm stands in the path of movement of two screws,  $d^2 e^2$ , passing through ears  $f^2$  extending from a plate,  $g^2$ , the shaft  $p$  passing through the ears  $f^2$ , and they having end movement in common with the shaft, by means of collars  $h^2$  fixed upon the shaft. The shaft  $p$  has upon one end a feed-screw, or feed-regulating screw,  $i^2$ , turning in a stationary nut,  $k^2$ , and the shaft is supported by such nut and

a bearing,  $b^2$ , in which the shaft slides and rotates. The collar  $x$  has an arm,  $m^2$ , extending down from it, the end of said arm entering a notch or recess,  $n^2$ , formed on the top of a box,  $o^2$ , through which the shaft  $p$  runs, the shaft sliding in the box. Within the box is a spring,  $p^2$ , placed between two sleeves,  $q^2$   $r^2$ , on the shaft  $p$ , and extending through opposite ends of the box. As the shaft  $p$  moves in either direction the spring  $p^2$  is compressed, the stress of the spring tending to throw the box forward in the same direction, the movement of the box being however prevented, as the arm  $m^2$  is locked by one of the pawls  $a^2$   $b^2$ . But when the shaft in its movement causes the screw  $d^2$  or  $e^2$  to release the pawl before it from the collar-shoulder the box is free to move, and is then driven forward by the stress of the compressed spring, the spring then losing its power by its expansion. This movement of the box reverses the position of the collar  $x$ , and enables the other pawl to be pressed under the collar-shoulder by the spring  $d^4$ . The screws being set or adjusted to accord with the length of screws to be cut upon the fittings, and the shaft being turned back until the screw  $d^2$  releases the pawl  $a^2$  from the shoulder  $y$ , permitting the spring  $d^4$  to throw the pawl  $b^2$  under the shoulder  $z$ , the pulleys  $s$  will be clutched to the pulleys  $q$ , the belts of which will then, through the train of gearing, rotate all the tool-spindles or mandrels, and the taps or cutters carried by them, so that the tools will advance to their work. The direction of rotation of the shaft  $p$  is also changed by the action of the pulleys  $q$ , and as soon as the shaft, in its forward movement, brings the screw  $e^2$  into contact with the pawl  $b^2$  said pawl is tripped from the shoulder  $z$ , when the expansion of the spring will throw the box forward, thereby causing the shipper-lever to carry the clutch-pulleys  $t$  into connection with the belt-pulleys  $r$ , and the pawl  $a^2$ , by the stress of the spring  $d^4$ , into engagement with the shoulder  $y$ , the parts being then in position for the back movement of the cutting-tools, which movement will thus automatically follow the advance movement of the tools. The vise is fixed upon a vertical spindle,  $w^2$ , extending through a slide-plate,  $v^2$ , that slides on guides  $w^2$ . The vise is made with arms or branches  $x^2$ , each having a vertical slot,  $y^2$ , into which the tail-pieces of the clamp-jaws extend. Each slot has two pairs of jaws, but they are shown in the drawing as extending from only one slot. The lower jaws  $z^2$  have, respectively, right and left hand nut-threads, into which the right and left hand threads of a screw,  $a^3$ , extend, and the upper jaws  $b^3$  have similar nut-threads operated by the threads of a screw,  $c^3$ , above the screw  $a^3$ . The screw  $c^3$  is tubular, and has fixed to its top a head,  $d^3$ , having arms by which to turn the screw, and the screw  $a^3$  has a spindle,  $e^3$ , extending through the screw  $c^3$ , and having at its top a handle,  $f^3$ . Under the handle is a washer,  $g^3$ , and a pin,  $h^3$ , extends from the handle into the washer, so that the spindle

and washer turn together. In the top of the head  $d^3$  is a groove,  $i^3$ , and into this groove a pin extends from the washer  $g^3$ . In gripping fittings varying in diameter the smaller one is placed between the jaws  $z^2$ , and the other between the jaws  $b^3$ . Then the head  $d^3$  is turned, and the end of the slot  $i^3$  striking the pin  $h^3$  the two shafts are turned together, both sets of jaws closing until the upper jaws gripe the fitting between them. Then the handle is turned, the pin  $h^3$  moving in the slot, until the lower jaws gripe the smaller fitting, which they will do before the pin reaches the end of the slot, both fittings being thus gripped ready for action of the screw-cutting tools.

The front and side jaws being charged with fittings, the taps cut the screw-threads in the fittings in the six pairs of jaws, and when the cutters move back, and pass out of the threads cut by them, the vise is moved back to clear the fittings from the cutters sufficiently to enable the vise to be moved a quarter-rotation. In my patent No. 25,779 the vise has an upward movement to effect this clearance for its quarter-rotation; but in my present invention the vise is moved back, and is then rotated either by hand or automatically, there being in either case no upward movement.

The back movement is effected as follows: The vise is jointed, by a link,  $k^3$ , to a pin,  $l^3$ , on a wheel,  $m^3$ , fixed on a cross-shaft,  $n^3$ . Said shaft has, at one end, a pulley,  $o^3$ , connected, by a cord,  $p^3$ , to a lever or arm,  $q^3$ , pivoted to the frame  $a$  at  $r^3$ ; and at the other end a pulley,  $s^3$ , carrying a cord,  $t^3$ , connected to a spring,  $u^3$ , or having hung to it a suitable weight. The lever  $q^3$  passes under a scroll-cam,  $v^3$ , fixed on the shaft  $p$ , and as the shaft  $p$ , in rotating, frees the cutters from their work the scroll-cam, acting upon the lever, depresses it, thereby drawing down the cord  $p^3$ , turning the shaft  $n^3$ , and causing the link  $k^3$  to press back the vise, the shaft turning against the stress of the weight or spring  $u^3$ . The back movement of the vise continues until it has reached such position as to enable it to be freely turned with its fittings, a concentric part of the cam coming against the lever  $q^3$ , so that after the vise has moved far enough continued movement of the cam does not affect the vise.

When the shaft turns in the other direction, to advance the cutters, the cam lets back the lever  $q^3$ . The stress of the weight or spring turns the shaft  $n^3$ , lifting the lever, and drawing the vise toward the cutters.

When the vise has reached its proper position for action of the tools, the connection of the link  $k^3$  to the wheel  $m^3$  will be so far turned as to be on a dead-center, or near enough thereto, to enable the vise to resist the forward pressure of the screw-cutting tools. With a weight or spring of sufficient power, however, there is not much tendency of the cutters to press back the vise, as they, in entering the fittings with their taper ends, immediately bite upon and cling to the surfaces of the tubes.

I claim—

1. The combination of the series of nuts  $c$ , screws  $d$ , gears  $g$   $h$ , shafts  $i$   $i$ , gears  $k$   $l$ , and pulley-shafts  $m$ , substantially as shown and described.

2. In combination with the leading-screws  $d$  and the gears  $g$   $h$   $k$   $l$ , shafts  $i$ , and pulley-shafts  $m$ , the sliding clutch-pulleys  $s$   $t$  and loose belt-pulleys  $q$   $r$ , arranged substantially as shown and described.

3. In combination with the shaft  $p$ , loose belt-pulleys  $q$   $r$ , and sliding clutch-pulleys  $s$   $t$ , the cross-shaft  $u$ , shipper-forks  $v$ , collar  $x$ , and arm  $m^2$ , for automatically effecting the slide movement of the pulleys.

4. The combination of box  $o^2$ , spring  $p^2$ , collars  $q^2$   $r^2$ , stops or screws  $d^2$   $e^2$ , collar  $x$  with its

shoulders  $y$   $z$  and arm  $m^2$ , shaft  $p$ , and pawls  $a^2$   $b^2$ , arranged and operating, substantially as described, for changing the shipper-lever.

5. The combination of cam  $v^3$ , lever  $q^3$ , shaft  $n^3$ , link  $k^3$ , and pulleys  $o^3$   $s^3$ , arranged substantially as shown and described.

6. The vise mounted, as shown and described, on the slide  $v^2$ , and operating in the manner set forth.

7. The combination, with the head  $d^3$  and screws  $a^3$   $c^3$ , of the washer-plate  $q^3$ , slot  $i^3$ , handle  $f^3$ , and pin  $x^3$ , substantially as described.

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Witnesses:

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